Bernays - (A. G.)

CHIPS FROM A SURGEON'S WORKSHOP

IDEAL CHOLECYSTOTOMY.

BERNAYS.

CHIP NO. IX.

IDEAL CHOLECYSTOTOMY,

A Successful Case, with Critical Remarks on the Pathology and the Different Operative Procedures Practiced on the System of Gall Vessels.

WITH SEVEN ILLUSTRATIONS.

BY

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A SUCCESSFUL CASE OF IDEAL CHOLECYSTOTOMY, WITH CRITICAL REMARKS ON THE PATHOLOGY AND THE DIFFERENT OPERATIVE PROCEDURES PRACTICED ON THE SYSTEM OF GALL VESSELS.

WITH SEVEN ILLUSTRATIONS.

BY AUGUSTUS C. BERNAYS, A. M., M. D, HDLBG., M.R.C.S., ENGLAND.

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Mrs. C. O. sent for me on October 9, 1884, to consult with her physician in regard to an abdominal tumor which had confined her to her bed for the past three weeks and had given rise to the most excruciating pain. The patient gave an excellent family history as to longevity and as to the absence of any constitutional debility. She is 46 years of age, married at 18, has given birth to thirteen children, seven of whom are living. Menstruation has always been regular;besides the usual diseases of childhood, has never been ill up to 1878. She states that her troubles began by a feeling of heaviness in the right hypochondriac region, accompanied by a very decided feeling of nausea. Since then she says she has never been quite well, not even for a single day. She soon began to have attacks of colic every month, which lasted for from one to six days. These attacks grew more frequent and gradually, during the last year, grew much worse, so that the patient was confined to her bed for weeks or even a month at a time. Gall stones were never suspected, there never was any jaundice and the general appearance of the patient had been good up to the last half year. Decided symptoms of cachexia, corresponding to very considerable loss in weight, had only been noticed recently by her relations and her physician, Dr. Drechsler, of St. Louis, Mo.

Three years ago, patient noticed a small hard lump in the region of the gall bladder,

but after showing it to her physician paid no more attention to it and thinks that it may have disappeared for a time. She has noticed a continual enlargement of the tumor only during the past six months.

On making a thorough examination of the patient, all her organs were found normal. The urine also normal in color and constituents. In the middle of the hypochondrium under the linea alba,midway between the umbilicus and the ensiform process, I found a tumor the size of a goose egg, perfectly smooth, very hard and very freely movable under the abdominal parietes, which were thin and devoid of fat. The tumor was equally movable in all directions from a point about two inches to the right of the linea alba and about one and a half inches below the edge of the ribs. The attending physician was much inclined to believe in a malignant tumor of the colon or small intestine. I thought of a floating kidney, an omental or a mesenteric tumor. I also considered among the possibilities we might find a diverticulum at the juncture of ileum and jejunum, which is often found and is known to be a rudiment of the omphalo-mesenteric duct, that might be the seat of disease or of a koprostasis. The very hard appearance of the tumor and the absence of fluctuation placed the diagnosis of gall stones among the most remote probabilities. An examination made with the assistance of a number of colleagues, the next day, left the diagnosis as uncertain as before. I then proposed explorative laparotomy, which was readily consented to.

On the morning of October 12, with the assistance of Drs. Bernays, Sr., L. Bauer, C. Barck, H. Wichmann, Kleinecke, Thornton and others, I performed laparotomy in the linea alba, beginning an inch below the xyphoid process and extending to the umbilicus. After introducing my hand, I rolled an elliptical smooth tumor into the incision, and by following the tumor to its place of attachment, I at once recognized it to be the immensely enlarged gall bladder. The tumor measured seven inches in length and nearly three inches in diameter; it was so filled with fluid that it gave the impression of being semi-solid even now, and I could feel no gall

stones in the sac. Passing my hand along the tumor to the hilus of the liver, I distinctly felt a hard substance the size of a large filbert, in the cystic duct. It was very evident now that this was a calculus which had become impacted in the duct and had caused obstruction with consecutive distension of the gall bladder. After having rolled the bladder as far as possible out of the abdomen, I pushed a troicart into the sac and emptied over a pint of perfectly clear, thick mucus into a vessel; only the last ounce or two that was emptied had a greenish deposit. After this procedure the sac became flaccid, and its walls having contracted, were as thick as a normal duodenum. A number of gall stones of different sizes were then felt loose in the sac, the one in the duct being firm and not movable in either direction. Next, I introduced a narrow-bladed knife into the troicart opening and made an incision one inch and a quarter in length, over the cupola of the sac, the latter being firmly held by a vulsellum, entirely without the abdominal cavity. I then emptied twenty stones of different sizes on a clean towel, which I had placed under and around the sac. Some were faceted in the shape of triangular pyramids, others were round. They were the common cholestearin stones, of a greenish brown color. I now introduced the index finger of my right hand into the sac and felt a round stone almost entirely covered by mucous membrane fastened in the beginning of the cystic duct. It seemed to have become engaged in the first convolution of the so-called valve (Valvula Heisteri) of the duct (Fig. I). The naked surface of the stone, which I could feel, was no larger than one-fourth of an inch square. I passed my left hand along the outside of the sac and by manipulation attempted to dislodge the stone. About fifteen minutes were wasted in this vain endeavor. I then introduced a probe-pointed knife into the sac in place of my right index finger, under guidance of the left hand upon the outside of the sac, carefully cut some of the tissues which constricted or rather surrounded the calculus. After making three or four nicks into the tissues, which consumed about fifteen minutes more, because the valve was

so tightly adherent to the calculus, that it was very difficult to pass the blunt end of the knife between the stone and the tissue in the dark, assisted only by the sense of feeling,

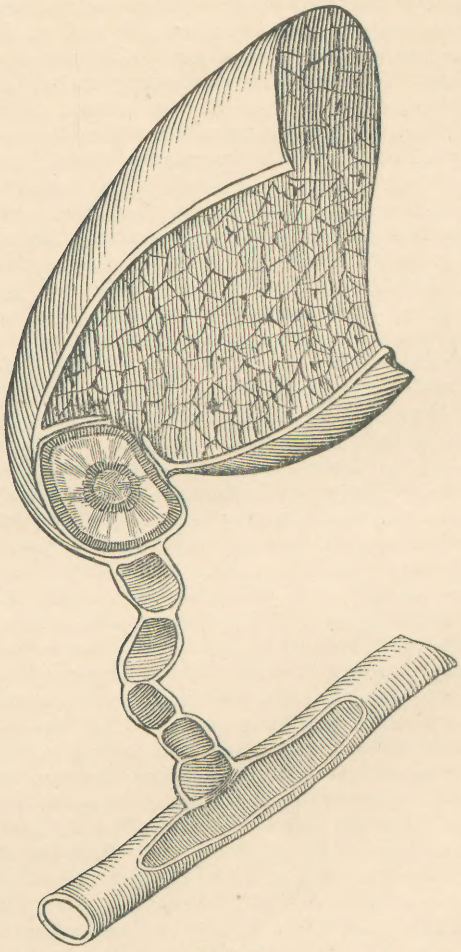

FIG. I.

this calculus suddenly yielded, the fingers of my left hand having forced it from its bed into the sac. I now easily removed the stone from the sac and after again assuring myself that there was no other stone or concretion anywhere in the system of gall ducts without the liver, I proceeded to close the cut into the gall-bladder. I had made up my mind long

before, when studying the surgery of gall passages, that if I had a chance to try Sir Spencer Wells' proposition, of closing the gall-bladder by a suture and returning it to the abdominal cavity, I should do so. After all, this method comes nearer the ideal of a surgical *restitutio ad integrum* than any other, and although I did not make use of the continued suture as proposed by him, I have proven by the successful termination of this case that the great ovariotomist's suggestion is practically correct. I shall return to this question in the epicritical remarks below.

While applying the suture to the incision of the sac, I noticed considerable oozing of blood within the sac. This bleeding ceased, however, before I had finished the introduction of the sutures. I used black, iron-dyed silk for the sutures, applied somewhat after the manner of the Czerny-Lembert suture, which Czerny and others have so successfully employed in their operations of excision of the pylorus. I first united the edges of the cut by the simple interrupted suture, using a

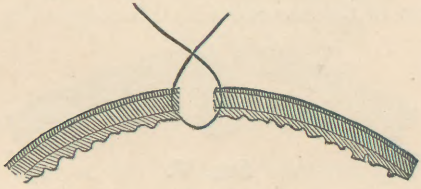

Fig. II.

very fine needle and the very thinnest silk. Seven sutures at regular intervals sufficed to accurately approximate the edges and close the wound. Before tying these seven sutures the sac was carefully cleansed by warm water injections, of some debris and small coagula that had formed within it. The sutures having been carefully tied, were cut short and

Fig. III.

I proceeded to introduce the Lembert sutures which were intended to embrace only the

peritoneum and perhaps some fibres of the muscular coat. It is well to remark in this

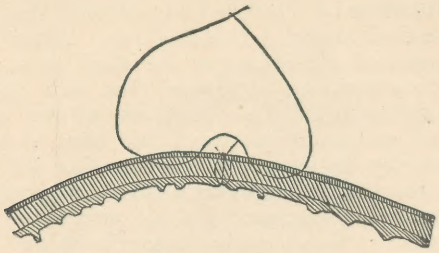

FIG. IV.

connection that after the sac was emptied and contracted the peritoneal as well as the other coats were much thickened and in excellent condition for the application of sutures. I applied eight of these Lembert sutures in such a manner as to completely cover the simple interrupted sutures when tied, and not only in the length of the original cut, but so as to have one stitch of the peritoneal suture beyond the ends of the incision as is shown in the accompaning Zincotype Fig. VI,

FIG. V.

which will also give a more accurate conception of the suture employed than I could otherwise impart.[1] No blood or any other foreign substance having escaped into the peritoneal cavity, the toilet was unnecessary and I pro-

1. I have taken great pains to make the illustrations of the suture employed in this case a true representation. If this suture has been well figured before in American surgical literature it has escaped my notice. Interrupted suture seems to me very much preferable to any other, but especially to the continued suture. Too much importance can not be given to the accurate finesses of suturing in the abdominal cavity. I would recommend the finest (thinnest) kind of silk. The knots must not be drawn too tightly and the ends should be cut very short. They will not slip the easier for being cut close. Fine silk is less irritating than catgut,which can not be furnished of reliable quality as thin as it should be for sutures of the intestine.

ceeded with the closure of the abdominal wound in the usual manner. A hypodermic injection of morphium was given and the patient was removed to her bed. I will state

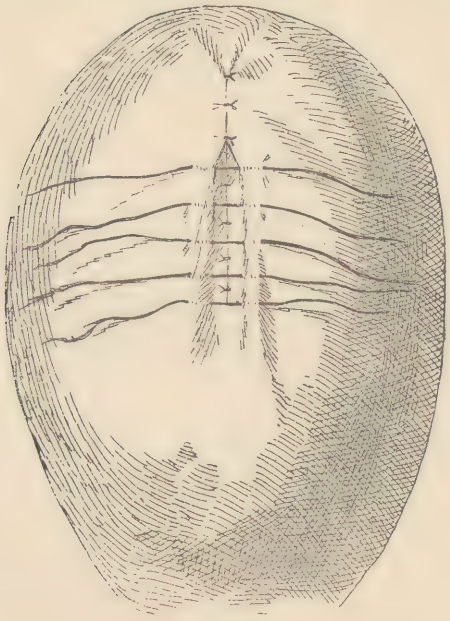

Fig. VI.

that none of the so-called Listerian or "antiseptic tricks" were made use of. All possible regard was paid to cleanliness and perfect purity of all instruments, sponges and extraneous materials used during the operation. Clean water was used, unadulterated by bichloride of mercury, carbolic acid or any other poison. In numerous laparotomies and other capital operations, I have had good reason to be satisfied with my results since I have abandoned Listerism, which I was taught to use while a student and assistant of the late lamented Prof. Gustav Simon, of Heidelberg.

The patient had no dangerous symptom after the operation whatever, her pulse never rose above 100 and her temperature never reached 101° F (38½°). The only symptom worthy of mention that I noticed during her recovery was an excessive vomit of nearly pure bile which occurred on the evening and

the night after the operation. Her husband estimated the quantity at about one china wash-bowl full. The fluid which I saw her vomit that evening, certainly was nearly pure bile and I have been at a loss to explain this curious occurrence to my satisfaction. The lady left her bed on the 21st day, and has gained some twenty pounds in weight since the operation. She now enjoys perfect health.[1]

ANATOMY.

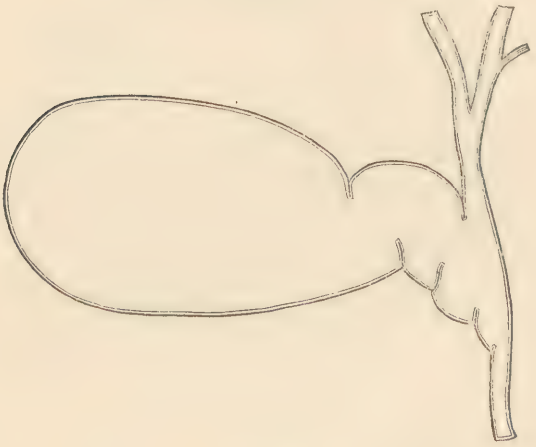

FIG. VII.

The above cut represents a section of a gall-bladder and the biliary ducts after they had been injected with alcohol and hardened. The specimen is from a cadaver that I performed a post-mortem on, the patient having died from apoplexy. During the past winter I have paid considerable attention to the parts involved in the present discussion, and I examined twenty livers in the dissecting-room or at autopsies, with a view to familiarize myself with the exact relations of the biliary passages. The patient was 49 years of age, had no liver symptoms and none pointing towards disease of the gall-bladder. It is the only case in which any distinct abnormity was found. All the others correspond, more or less exactly, to the description given

1. The patient at this time, October 1, 1885, is in splendid health, living at Fayetteville, Ills.

in our text-books of anatomy. The abnormity in this case consists of a very much dilated cystic duct; in other words, the opening of the gall-bladder into the common duct is a very large one, the cystic duct being only represented by some rudiments of Heister's valve, in the shape of shallow folds of the parietes. The walls of the bladder are normal in thickness and structure. There are no signs of chronic inflammation either in the mucous membrane or in the connective tissue surrounding the ducts. The peritoneal covering is also normal. The contents were thin, normal bile. This observation appeared to me of sufficient importance for publication, principally because of its rarity and also because it would seem that a ligature of a gall-bladder in this condition for the purpose of its removal might result in the direct failure. In the first place let it be remembered that the healing process after ligating a canal lined with mucous membrane, i. e., the permanent closure is primarily independent of the epithelium, but is achieved by the formation of a cicatrix in the plastic material thrown out by the connective tissue surrounding the ligature and the stump. No doubt this process is easily achieved when the cystic duct is of normal dimensions. But let us suppose a ligature were to be thrown around the opening of a gall-bladder in such a manner that the neck is drawn together and the points a and b approximated. This constriction would necessarily cause a folding of the hepatic duct, the consequences of which can not be exactly given, but would certainly cause peculiar complications of the healing process. Although the condition above described is probably a very rare one, I am sure it deserves our attention and in fact can be regarded as a contra-indication to cholecystectomy, if this operation be contemplated. The only explanation I can give of my discovery is that, it is a congenital deformity. None of the circumstances warrant me in supposing a dilatation caused by the passage of a stone.

Physiology.

But little is known of the influence and uses of the human bile. We thoroughly understand its chemistry, we know approximate-

ly the quantity of the secretion. As good as nothing is known of the use and function of the gall-bladder. We do not know whether it is filled and emptied periodically, or whether the flow is a constant one. I have vainly searched in literature for a statement of the amount of pressure normally present in the bladder or the ducts. In a case where I performed laparotomy on the supposition of cholelithiasis, I found the gall-bladder a flabby sac, containing no calculi, and I could squeeze the bile out of the bladder with great ease by compressing the thin normal sac.[1] There was certainly no amount of pressure in this flabby sac. It is certain that the glands in the walls of the bladder secrete mucus. Lawson Tait believes this mucus contains some kind of ferment. The fibrous layer of the gall-bladder contains some muscular tissue. I have found it present in all bladders, but it is very thin and weak. Since the operation of cholecystotomy with the establishment of an abdominal, direct, biliary fistula has

1. I performed laparotomy in this case on Sunday, November 6, 1884, in the presence of Dr. Louis Bauer, Dr. C. Barck, Dr. Thornton, and a number of students. The diagnosis was cholelithiasis; patient had been a sufferer for about three years, had been treated by a number of our best practitioners (Drs. C. Heyer and Nidelet). They all diagnosed gall-stones and administered opium or morphine, during the frequent and extremely painful attacks of colic. I witnessed several of the attacks myself and was perfectly convinced of the presence of gall-stones, having found the urine normal and no symptoms of disease of the stomach or intestines. The patient is a Belgian, very brown skin, icterus had never been made out with certainty, and although a careful search of the stools after the last four accesses of colic had failed to discover a calculus, I was not shaken in my opinion. The patient himself was also convinced that he had gall-stones. Since he had the unanimous opinion of six or seven worthy physicians, he not only consented, but urged me to perform an operation which he knew to be dangerous. His spasms and pains were so terrific that they nearly made him unconscious, and he would writhe on the carpet or the bed in fearful agony until relieved by an opiate. His hope for permanent relief from these sufferings, as well as my promise that he would be cured if he survived the removal of the gall-stones, made him eager for the operation. After opening the abdomen and introducing my hand far enough to examine all the bile vessels, the duodenum and stomach, and finding them all, most

been performed on the human subject, numerous observations and experiments have been made in order to determine the use of the bile to the organism. In a number of cases where these fistulas persisted for months (seven months in one case) the stools were almost milkwhite and the entire amount of the bile dribbled out of the fistula, not the slightest symptoms of disease or disturbed digestion or alimentation could be observed.[2] The administration of calomel, iron, salts, podophyllin, aloes or rhubarb do not seem to have the slightest effect upon the quantity or chemical constituents of the secretion. No

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surprisingly normal, I closed the wound. The healing process was rapid and simple. The patient left his bed after two weeks. He was under the influence of chloroform one hour. Fortunately, there were no attacks of colic during the three weeks after the operation, and, indeed, there were none for about seven weeks. The patient, who was informed of the futility of our operation and the error of diagnosis, as well as I myself, began to entertain hopes that the operation after all had in some unaccountable way cured his spasms, which I then supposed were of a nervous origin. This patient, being thoroughly acquainted with the scientific error in diagnosis and the grave danger to which it had subjected him, nevertheless paid his bill most cheerfully—greatly to my surprise.

Some time in Jannary of 1885, while I was still confined to my room, recovering from an attack of septicemia, my former patient called on me and stated that he again suffered fearfully from his colics, perhaps worse than ever before, and that he had noticed blood in his urine after the last attack! A change came over the spirit of my dreams. Nephrolithiasis of the right kidney is now the diagnosis. I expect to remove the stones or perhaps the entire kidney by lumbar incision within the year, the patient being again willing to trust to the knife as a final resort.

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2. I had the good fortune to see and clearly observe an aged negress during the past three years who claimed that eleven years ago the late honored Dr. J. T. Hodgen opened a boil in her right hypochondriac region from which at various times gall-stones have since been discharged. Her stools have been clay-colored ever since, all the bile escaping at the fistula. I can testify to the good health of this woman; she has no extraordinary flatulence nor any other of the symptoms usually ascribed to this trouble. Cholecystotomy might even now lead to the detection of a curable obstruction in her case and consequent closure of the fistula.

effects have been noticed either after the administration of quinine, morphine or cocaine. In some cases the patients have gained in weight and health while losing all their bile through a fistula. Tait says there is not the slightest evidence of flatulence and decomposition which is said in the text-books to accompany biliary fistula. After a careful perusal of all the accessible literature on this subject I have come to the conclusion that the bile is almost if not entirely as much of an excretion as the urine. Even the much praised emulsifying power of the bile is probably only an accidental quality, certainly not a necessary one. The trypsin of the pancreas according to KUEHNE is entirely sufficient to emulsify all the fats that come into the intestines.

SURGICAL PATHOLOGY.

Messrs. J. H. MUSSER and W. W. KEEN, in an exhaustive paper on cholecystotomy, published in the American Journal of the Medical Sciences, October, 1884, give a tabulated report of all cases recorded in literature up to that time, with medical and surgical comments. But few additional cases have been published since then, and I may refer to this careful and interesting study for the historical and statistical information we have on the subject. Only one important paper has appeared since; LANGENBUCH, "Some points concerning operations on the biliary system," Berliner Klinische Wochenschrift, December, 1884, Nos. 51 and 52. The author treats principally of cholecystectomy giving a defense of this operation. He is its inventor and has had three successful cases out of five operations. Tait speaks of three deaths out of six and declares Langenbuch's operation to be "intrinsically absurd." Langenbuch enters into a lengthy discussion and tries to avert Mr. Tait's criticism, accusing him of errors and absurdities. Sir Spencer Wells' proposal receives severe criticism at the hands of both these gentlemen. I cannot enter here into a discussion of the opinions of these gentlemen and will confine myself exclusively to the facts. Langenbuch formulates his conclusion in regard to the indications for operative procedure into nine prop-

ositions. Their consideration in regular order will enable me to bring out all the points that have been determined heretofore, as well as any new ones that may be proven by my successful case, which is the first of its kind. Before entering upon this task I may mention the different methods of operation which claim our attentive deliberation.

All cases where the formation of a biliary abscess either led to the natural end of pointing, followed by the spontaneous discharge of calculi, or where such an abscess was opened by artificial means and the stones extracted belong within the realm of minor surgery, their treatment offers no dark points, and is consequently excluded from our consideration.

I. The first and most frequently practised method is cholecystotomy with the formation of an abdominal fistula. The incision is usually made parallel to the free margin of the liver an inch or two below the ribs. This is Sims' operation. Lawson Tait says of it: "It has satisfied me that my much lamented friend, Dr. Marion Sims, laid down principles from which we are not likely to depart with any advantage, and that he practically perfected this operation, though he did not meet with a successful result in his case." "The conclusion of the surgical experience in these cases is, that the entire possibilities of the treatment of gall-stone and distended gall-bladder are exhausted in Dr. Marion Sims' original paper published in the British Medical Journal, that no further extension of it seems possible, and that no further experimentation, such as that of Spencer Wells and Langenbuch, seems desirable." I have found forty-two cases of this operation in literature with ten deaths and thirty-two recoveries, a mortality of 23.5 per cent. Seventeen of these operations were done by Lawson Tait without a single death.

II. The second operation seems to have been done five times, three recoveries and two deaths; the reports are very vague and unreliable.

Bobbs, of Indiana, June 15, 1867, did an operation which he calls lithotomy of the gall-bladder. There was an obscure abdominal tumor, and after having done laparotomy he incised the gall-bladder, removed some cal-

culi, put one stitch into the incision and dropped the gall-bladder back. The patient recovered, thereby greatly surprising the attending physicians.

An anonymous surgeon mentioned by Tait did the operation; the patient died (particulars unknown).

Courvoisier did an operation somewhat similar to my own, of which I am also unable to find particulars; the case ended in recovery.

The fourth case was done by Meredith, Ashurst's International Encyclopedia of Surgery, Vol. 5, p. 1073; it was unsuccessful, the patient dying about forty hours after the operation. It is claimed that death was caused by suppression of urine and that the stitches in the gall-bladder were all right, although several ounces of bile were found in the folds of the mesentery.

The fifth case is my own, which is detailed above, resulting in complete recovery. It is clear that this operation restores the parts involved entirely to their normal state.

III. The third procedure is called Langenbuch's operation, or cholecystectomy. It consists in ligating the cystic duct and dissecting away the entire gall-bladder. Five cases by Langenbuch, two deaths. Courvoisier, one case recovered, 33½ per cent died.

IV. The fourth operative procedure is called cholecystenterostomy and was first put into practice by von Winiwarter in 1882. It has for its object the establishment of a communication between the gall-bladder and the small intestine in cases, where it is desired to prevent the loss of bile through an abdominal fistula, where either a calculus or some other organic disease has caused an obstruction of the common duct. Dr. J. McF. Gaston, of Atlanta, Georgia, has experimented on dogs in regard to the feasibility of this plan. His experiments were not concluded when he published his paper in October, 1884, in Gaillard's Journal. The manner in which he tries to make a communication between the gall-bladder and the duodenum is not clear. I find such a plan almost anatomically impossible in the human body. Some of those present will remember a short report I gave at the last meeting of this society, about a

method of making a communication between any two given hollow intestines that could be easily approximated, by means of the elastic ligature. I stated then that a communication could thus be made between the gall bladder and the colon.

We can dismiss this procedure from our consideration, since it seems reasonably certain that the bile is not an essential factor of proper digestion, and that before we attempt to cure a trouble not necessarily fatal we should not subject our patients to surgical experiments endangering life.

At any rate it seems clear that if we attempt the operation of cholecystenterostomy at all, we would choose the colon as the most convenient bowel into which the gall-bladder might be stitched.

Von Winiwarter's case is as yet unique.

Let us now examine Langenbuch's nine propositions before we establish our own final rules. I have translated them, and I believe they have never appeared in the English language before:

No. 1. Gall-stones are developed in the gall-bladder as a rule, only exceptionally in the biliary ducts of the liver, and never, or very rarely, in both localities simultaneously.

No. 2. Cholelithiasis (the gall-stone disease) requires surgical interference only in exceptional cases.

No. 3. This interference or treatment may consist in the simple evacuation of the calculi from the bladder, or in the total extirpation of the bladder.

No. 4. Both operations should only be performed when the common duct is patulous, and when there is no sign of icterus; and only after the walls of the bladder have been carefully examined and the absence of calculi in the large ducts is proven.

No. 5. The mere evacuation is only permissible when the walls of the bladder prove normal, i. e., in fresh cases.

No. 6. This operation (Sims', Tait's) has serious defects under any circumstances, for (a) it necessitates the same inroad upon the abdominal cavity as extirpation (Langenbuch's). (b) The acts of sneezing, coughing or vomiting may cause fatal damage by rupturing the stitches which fasten the bladder

to the abdominal incision. (c) It compels the establishment of an uncomfortable and injurious biliary fistula for an indefinite period of time; (d) and it gives no protection from a return of the disease, since it only removes the product but not the work shop of the disease.

No. 7. The operation of cholecystectomy, in comparison with the above, is without dangerous complications, and is radical since it precludes the return of the causative disease.

No. 8. Since the majority of cases of permanent obstruction of the common duct is in causal relation to cholelithiasis (direct occlusion by a stone; chronic inflammation with consecutive stenosis, or even malignant neoplasma following the frequent irritations and lesions which accompany the passage of stones) the operations should be contemplated early, in order to prevent this obstruction, and for the same reason extirpation should be preferred to evacuation.

No. 9. The only advantage that simple evacuation would have over extirpation might be said to be the lack of a gall bladder in case an obstruction of the common duct should be developed, and the operation of cholecystenterostomy would be planned. But even in this case a communication might be established between the immensely dilated hepatic ducts and a loop of intestine. Perhaps even an artificial communication might be made between the dilated common duct and the duodenum above the seat of stricture.

When Dr. Langenbuch drew up these conclusions, he was controlled by a firm belief in the hypothesis that, digestion can not exist in the long run minus bile. He furthermore plainly states in his article that he can not entertain the idea of uniting the incision in the gall bladder by sutures, and then abandoning it in the abdominal cavity. My own case proves that this idea is feasible, and that it must be entertained at least in some cases. His hypothesis also is very much shaken by recent observations.

We must agree with the first and second of Langenbuch's theses. They are well established rules of pathology and therapeutics.

The third proposition does not claim our

consent. We discard it on the grounds of insufficiency. It does not cover the case.

The fourth proposition is totally and radically false. The very contrary is true. Cholecystotomy should be performed when the common duct is occluded by a calculus or otherwise obstructed, whether there be jaundice or not. Cholecystectomy should not be performed in this condition.

Nature teaches us in these cases. Nearly all biliary fistulæ of spontaneous origin are complicated with icterus and caused by obstruction of the ducts, followed by adhesion and abscess. We must follow nature; her course is a wise one and has saved many lives. Where there is obstruction of the ducts we must perform cholecystotomy, the indication is vital. Cholecystectomy would lead to extravasation of bile, peritonitis and death. This restriction applies only to cholecystectomy, but not to the other operations.

Proposition five is equally erroneous. Sims' operation is indicated when we have severe ulceration, and when we find the walls of the bladder diseased. It should not be limited to fresh cases. Tait's cases prove this conclusively. We are accustomed to find the mucous lining of the bladder after lithotomy in a very bad state of chronic thickening and ulceration; sometimes even large sloughs are found. This condition is due to the irritation of the stones. After the removal of the stone the bladder returns to its normal state in a remarkably short space of time. The same is true of the gall-bladder after the establishment of an opening.

The sixth proposition is intended to clearly call attention to the defects of cholecystotomy. The first objection appears to be untrue at a glance: "It necessitates the same inroad upon the abdominal cavity as extirpation." The time required for the removal of the entire organ must be greater than that required for merely opening and stitching it to the abdomen. The lesion made by detaching the gall-bladder from the lower surface of the liver also seems to be a source of trouble that is entirely avoided in cholecystotomy, either Sims' or the ideal.

The second objection is perhaps well taken. But in the light of Tait's and others' exper-

ience is unimportant, and up to date only an imaginary danger.

The third objection is also true, but is not of vital importance, inasmuch as we must always choose the lesser of two evils in our attempts to cure disease.

The fourth objection is not well taken, for we have no kind of guarantee that a calculus may not descend from the bile ducts of the liver and obstruct the common or larger ducts, after the removal of the bladder. It is well known that the last three-quarters to one inch of the common duct is the narrowest part of the entire length. Then, indeed, unless a passage of the calculus is soon effected, a fatal jaundice or rupture must ensue. The gallbladder would seem to be a sort of a safety valve into which the bile that cannot escape through the common duct is stored for a time. There are cases known where the gallbladder became so much distended that it reached into the pelvis, and still recovery by natural means was seen to follow. Supposing now that the gall-bladder had been removed entirely, it is evident that the remedies of nature must fail. There can neither be distension of the safety bag, nor can there be the establishment of a fistula, either by natural or artificial means. The mere fact of a diseased condition of the gallbladder is not sufficient reason for us to remove the entire organ. If the disease is curable by merely opening the bladder for a period of several weeks we dare not remove it. If the gallbladder, however, is attacked by malignant disease, as for instance, epithelioma, sarcoma or some form of carcinoma, its extirpation would be very proper.

Proposition No. 7 is evidently untenable, as we have just seen.

Proposition No. 8 is a partial contradiction of his own No. 2. The afterthought which is thrown in has been refuted under the discussion of No. 6 and 4.

Proposition No. 9 merely proves that the author himself, feeling the weakness of his position, is compelled to find an outlet from the false position in which he has placed himself, or rather it is a vague proposition for some very daring surgery with which he would try to save the lives of the patients

who might fall victims to an obstruction after his operation, cholecystectomy, had been performed on them.

Having now arrived at the end of the work, I may be permitted to offer my own conclusions and I respectfully submit them as folfows:

I. The causes which indicate an operative interference with the system of gall vessels are: *a*, jaundice, *b*, paroxysmal pain or a tumor in the right hypochondriac region; *c*, suppuration; *d*, peritonitis;[1] these conditions to be either collectively or singly recognizable, the presumable origin being biliary calculi; *e*, malignant disease.

II. Explorative Laparotomy must be preferred to acupuncture or aspiration as a diagnostic measure.[2]

III. The incision in the linea alba is preferable when there is much doubt regarding the seat of obstruction, because the large ducts can be reached much better from this incision than from the incision parallel to the free border of the ribs.

IV. The escape of bile through an abdominal fistula is not injurious to the process of normal digestion. The bile is an excretion, and probably of no more use in the intestinal canal than the urine in the bladder.

V. Jaundice, when caused by an obstruction of the common duct is no contraindication to natural cholecystotomy. We may often save life by its early performance.

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1. I was much surprised to find that no author has enumerated peritonitis caused by perforation of the gall-bladder among the indications for cholecystotomy. In calling the attention of the surgeons to this point, I anticipate universal consent. I am in a position to know of at least one case where my operation would, most probably, have saved a thoroughly useful life. I refer to the sad and premature death of Dr. John T. Hodgen. The post-mortem in his case proved the sole cause of death to be peritonitis, caused by a minute perforation of the gall-bladder. He had been a sufferer from periodical attacks of biliary colic for many years.

2. There are two fatal cases on record after acupuncture of the gall bladder.

VI. Cholecystotomy, Natural and Ideal, and Cholecystectomy are the three operations at our service; cholecystenterostomy may be useful, but it has not yet earned a place among approved surgical procedures.[1]

VII. Ideal cholecystotomy is indicated when the bladder is normal in structure and when the gall-ducts have been cleared of obstructing calculi.

VIII. Natural cholecystotomy is indicated when the bladder is ulcerated or suppurating, or when there are permanent obstructions beyond reach at the time of operation.

IX. Cholecystectomy should be limited to cases of otherwise incurable or malignant disease of the gall-bladder.

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1. The case of Dr. Chas. Parkes, of Chicago, would seem to prove that the sounding of the common duct through the external opening should be enumerated among the operative procedures in this connection His case is unique in many ways, and although this method was successful in his own case, the author modestly thinks it would be presumptuous to advise its general use. I hope that Dr. Parkes will be able to keep his case in view for some time to come and report progress.

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